



EXHIBIT 1

11. A touch screen digitizing system including a touch screen unit including a first resistive sheet [30] with opposed first [50] and second [51] terminals and a second resistive sheet [31] with opposed third [52] and fourth [53] terminals, and an analog-to-digital converter having a reference input terminal, the improvement comprising in combination:

(a) a first switch [19] coupled between a first reference voltage [GND] and the second terminal [51], and a second switch [18] connected directly between the first terminal [50] and a second reference voltage [VCC] for energizing the first resistive sheet [30];

(b) a third switch [21] coupled between the first reference voltage [GND] and the fourth terminal [53], and a fourth switch [20] connected directly between the third terminal [52] and the second reference voltage [VCC] for energizing the second resistive sheet [31]; and

(c) an analog-to-digital converter [22] and switching circuitry [15,16,17] for coupling a first input [+IN] of the analog-to-digital converter to the third terminal [52] while the first resistive sheet [30] is energized and the second resistive sheet [31] is not energized, and for coupling the first input [+IN] to the first terminal [50] while the second resistive sheet [31] is energized and the first resistive sheet [30] is not energized, the analog-to-digital converter having a first reference terminal [+REF] coupled to the second reference voltage [VCC], and a second reference terminal [-REF] coupled to the first reference voltage [GND],

wherein the analog-to-digital converter [22] is a successive approximation analog-to-digital converter including a CDAC, a comparator coupled to an output of the CDAC, and a successive approximation register coupled to an output of the CDAC, and wherein the first input [+IN] is coupled to a first input of the CDAC, the first input [+IN] being selectively coupled by a fifth switch [16] in the switching circuitry to a selected one of the first terminal [50] and the third terminal [52], the first reference terminal [+REF] being selectively coupled to the second reference voltage [VCC] by coupling the first reference terminal [+REF] to a corresponding one of the first terminal [50] and the third terminal [52] by means of a sixth switch [15] in the switching circuitry, the second reference terminal [-REF] being selectively coupled to the first reference voltage [GND] by coupling the second reference terminal [-REF] to a corresponding one of the second terminal [51] and the fourth terminal [53] by means of a seventh switch [17] in the switching circuitry.

12. A touch screen digitizing system including a touch screen unit including a first resistive sheet [30] with opposed first [50] and second [51] terminals and a second resistive sheet [31] with opposed third [52] and fourth [53] terminals, and an analog-to-digital converter having a reference input terminal, the improvement comprising in combination:

(a) a first switch [19] coupled between a first reference voltage [GND] and the second terminal [51], and a second switch [18] connected directly between the first terminal [50] and a second reference voltage [VCC] for energizing the first resistive sheet [30];

(b) a third switch [21] coupled between the first reference voltage [GND] and the fourth terminal [53], and a fourth switch [20] connected directly between the third terminal [52] and the second reference voltage [VCC] for energizing the second resistive sheet [31]; and

(c) an analog-to-digital converter [22] having a first input [+IN] and a second input [-IN], and switching circuitry [15,16,17] for coupling the first input [+IN] to the third terminal [52] while the first resistive sheet [30] is energized and the second resistive sheet [31] is not energized, for coupling the first input [+IN] to the first terminal [50] while the second resistive sheet [31] is energized and the first resistive sheet [30] is not energized, and for coupling the second input [-IN] to the first reference voltage [GND], the analog-to-digital converter having a first reference terminal [+REF] coupled to the second reference voltage [VCC], and a second reference terminal [-REF] coupled to the first reference voltage [GND],

wherein the analog-to-digital converter [22] is a successive approximation analog-to-digital converter including a CDAC, a comparator coupled to an output of the CDAC, and a successive approximation register coupled to an output of the CDAC, and wherein the first input [+IN] is coupled to a first input of the CDAC and the second input [-IN] is coupled to a second input of the CDAC, the first input [+IN] being selectively coupled by a fifth switch [16] in the switching circuitry to a selected one of the first terminal [50] and the third terminal [52], the first reference terminal [+REF] being selectively coupled to the second reference voltage [VCC] by coupling the first reference terminal [+REF] to a corresponding one of the first terminal [50] and the third terminal [52] by means of a sixth switch [15] in the switching circuitry, the second input [-IN] and the second reference terminal [-REF] being selectively coupled to the first reference

29 voltage [GND] by coupling the second input [-IN] and the second reference terminal [-REF] to a
30 corresponding one of the second terminal [51] and the fourth terminal [53] by means of a seventh
31 switch [17] in the switching circuitry.

1 13. A touch screen digitizing system including a touch screen unit including a first
2 resistive sheet [30] with opposed first [50] and second [51] terminals and a second resistive sheet
3 [31] with opposed third [52] and fourth [53] terminals, and an analog-to-digital converter having
4 a reference input terminal, the improvement comprising in combination:

5 (a) a first switch [19] coupled between a first reference voltage [GND] and the
6 second terminal [51], and a second switch [18] connected directly between the first terminal [50]
7 and a second reference voltage [VCC] for energizing the first resistive sheet [30];

8 (b) a third switch [21] coupled between the first reference voltage [GND] and
9 the fourth terminal [53], and a fourth switch [20] connected directly between the third terminal
10 [52] and the second reference voltage [VCC] for energizing the second resistive sheet [31]; and

11 (c) an analog-to-digital converter [22] having a first input [+IN] and a second
12 input [-IN], and switching circuitry [15,16,17] for coupling the first input [+IN] to the third
13 terminal [52] while the first resistive sheet [30] is energized and the second resistive sheet [31] is

not energized, for coupling the first input [+IN] to the first terminal [50] while the second resistive sheet [31] is energized and the first resistive sheet [30] is not energized, and for coupling the second input [-IN] to the first reference voltage [GND], the analog-to-digital converter having a first reference terminal [+REF] coupled to the second reference voltage [VCC], and a second reference terminal [-REF] coupled to the first reference voltage [GND],

wherein the analog-to-digital converter [22] is a successive approximation analog-to-digital converter including a CDAC, a comparator coupled to an output of the CDAC, and a successive approximation register coupled to an output of the CDAC, and wherein the first input [+IN] is coupled to a first input of the CDAC and the second input [-IN] is coupled to a second input of the CDAC, the first input [+IN] being selectively coupled by a fifth switch [16] in the switching circuitry to a selected one of the first terminal [50] and the third terminal [52], the first reference terminal [+REF] being selectively coupled to the second reference voltage [VCC] by coupling the first reference terminal [+REF] to a corresponding one of the first terminal [50] and the third terminal [52] by means of a sixth switch [15] in the switching circuitry, the second input [-IN] being selectively coupled to the first reference voltage [GND] by coupling the second input [-IN] to a corresponding one of the second terminal [51] and the fourth terminal [53] by means of a seventh switch [17] in the switching circuitry.